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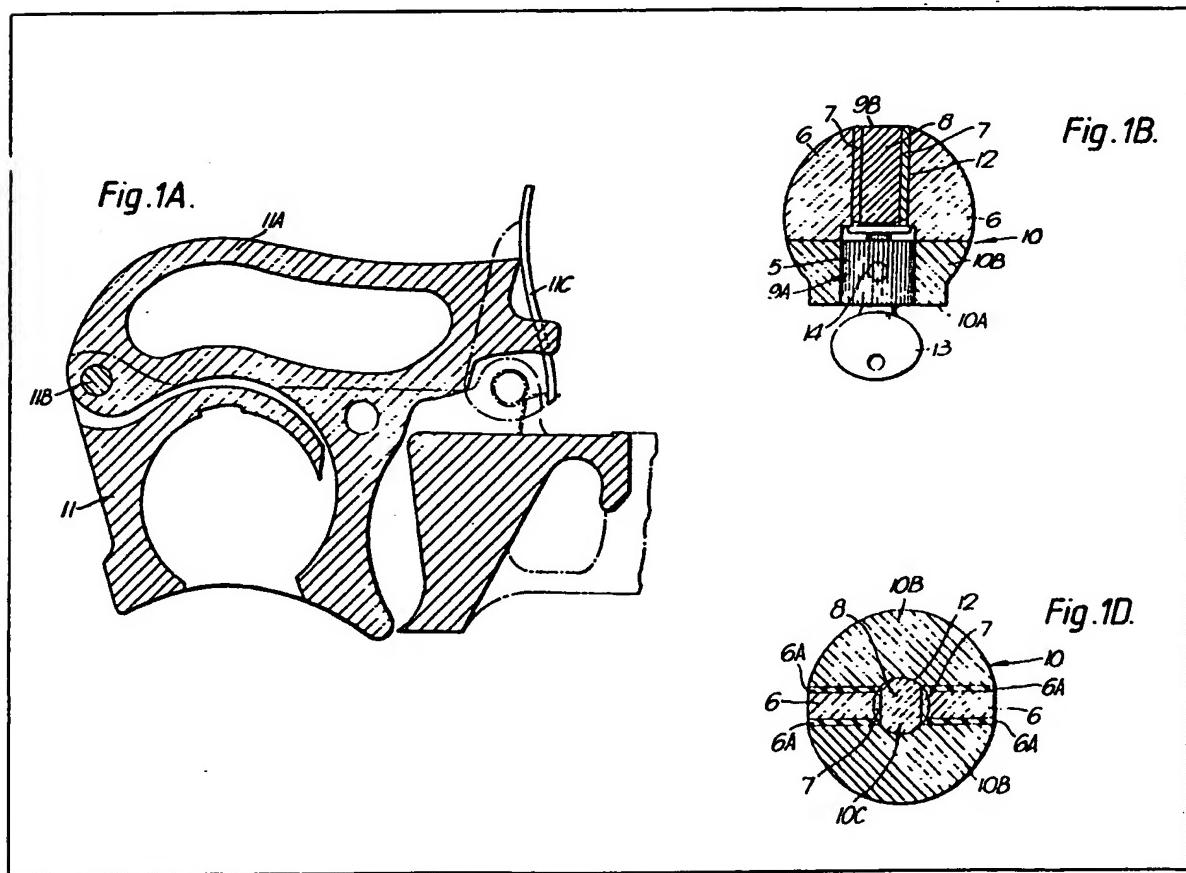
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## (54) Preventing vehicle theft

(67) A locking device (10) for use with ball and socket towing hitches to prevent unauthorised removal of an unhitched trailer is of substantially spherical shape to fit into the socket of a socket mounting (11). The device has a first member (10B) of non-magnetisable material and a second member (10C) extending therein to be rotatably movable relative thereto. The first member (10B) has diametrically-opposed permanent magnets (6) and the second member (10C) has a ferrous portion (8) segmentically-flanked by non-ferrous portion (7) whereby with the device in the socket of a

socket mounting (11) and an rotatable movement of the second member (10C), the device (10) is either magnetically secured to the socket mounting (11); or not secured and able to be removed.



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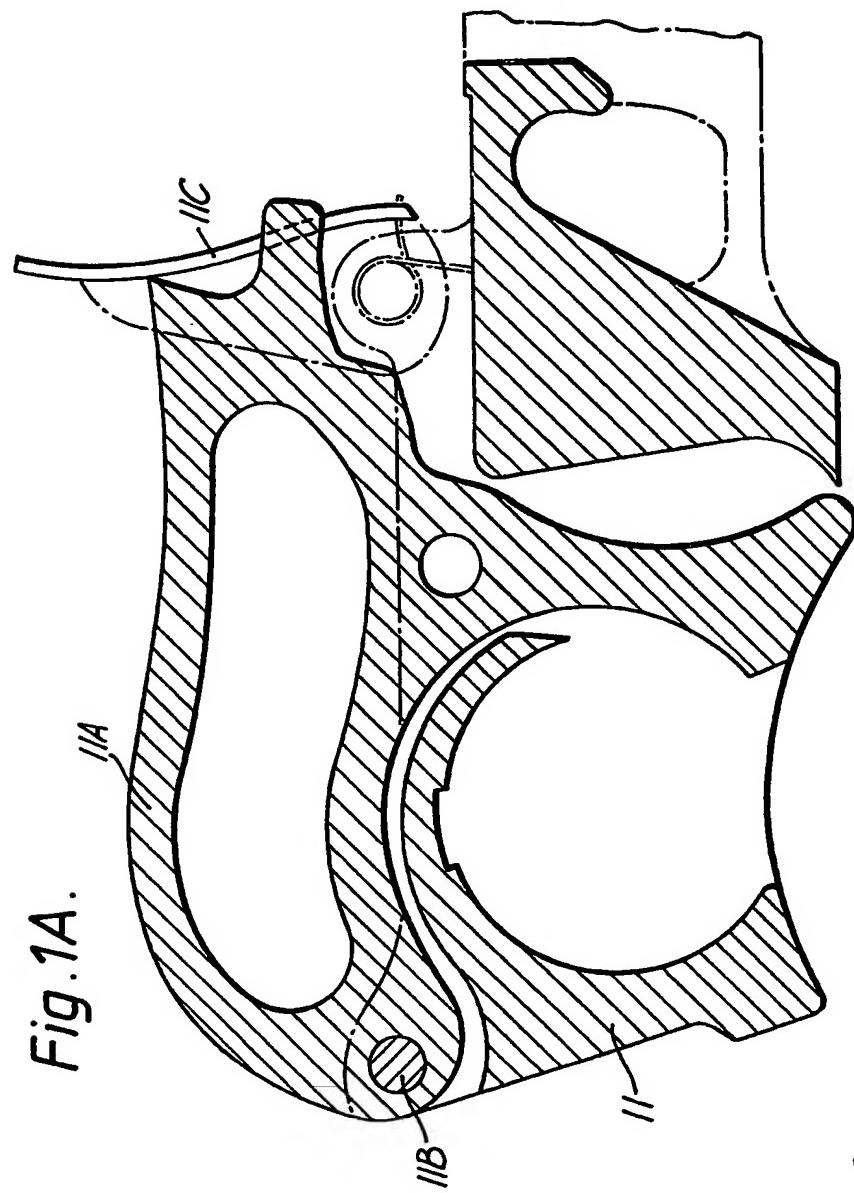


Fig. 1A.

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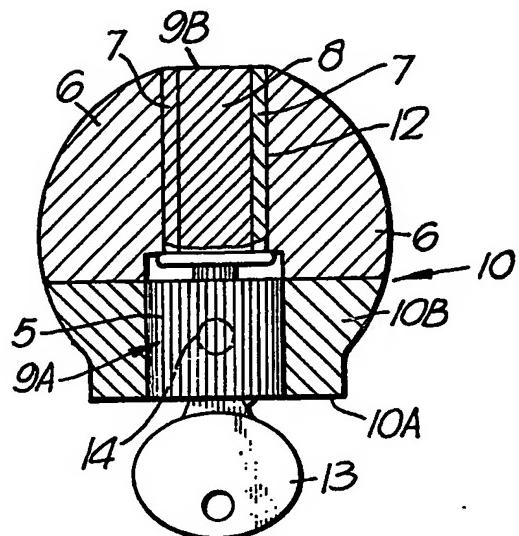


Fig. 1B.

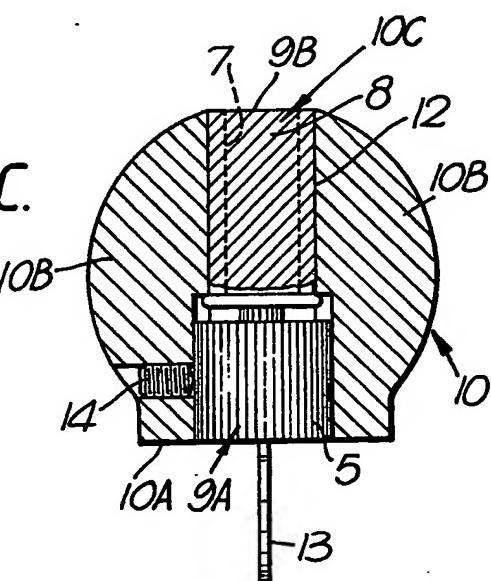


Fig. 1C.

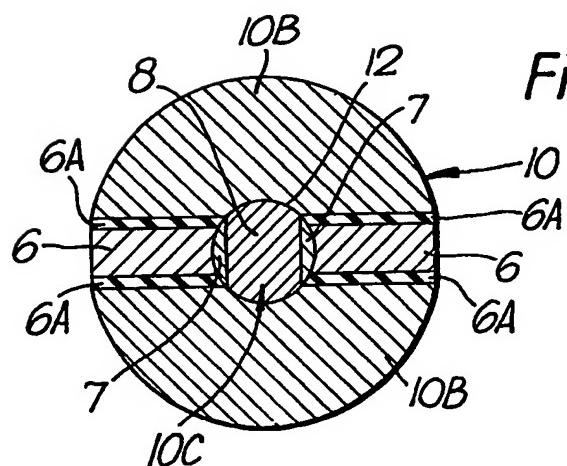


Fig. 1D.

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Fig. 2A.

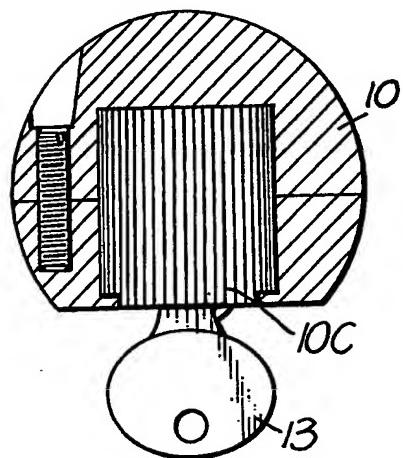


Fig. 2B.

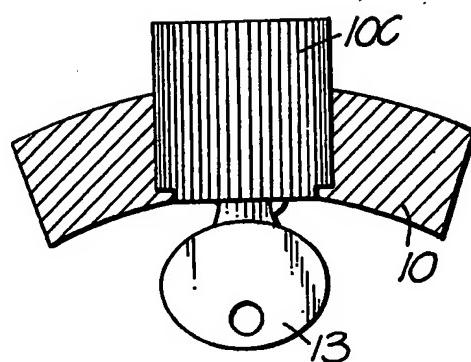


Fig. 2C.

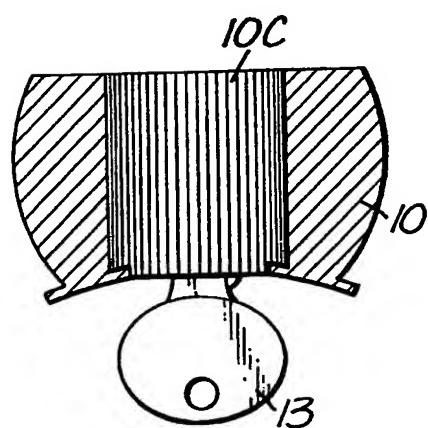
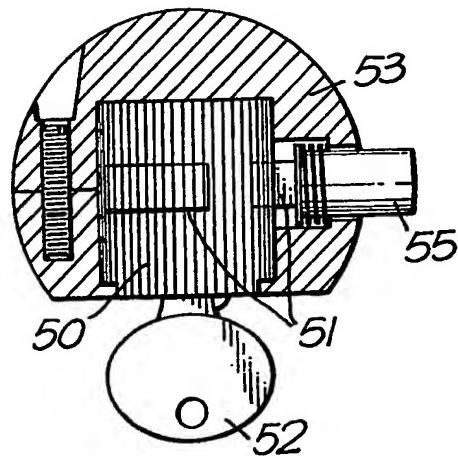


Fig. 3A.



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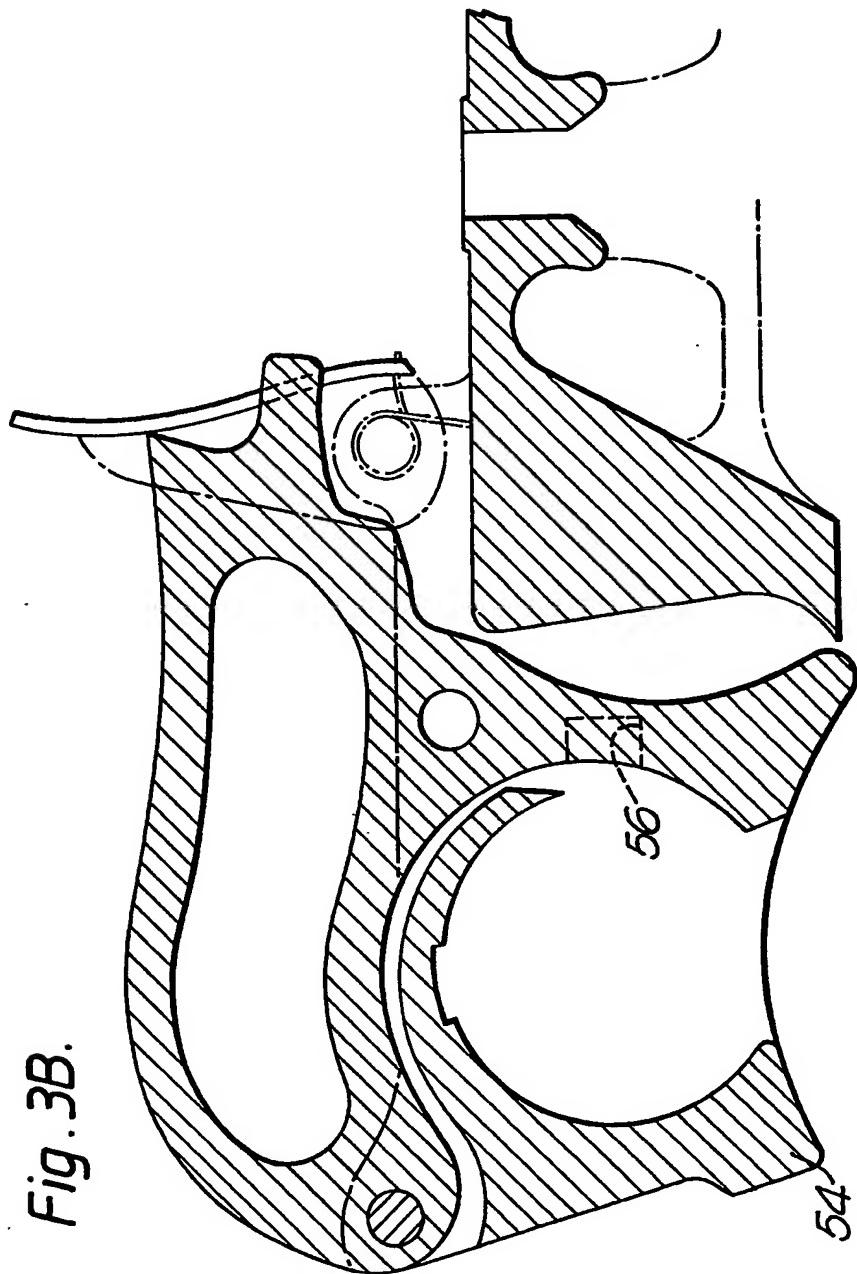
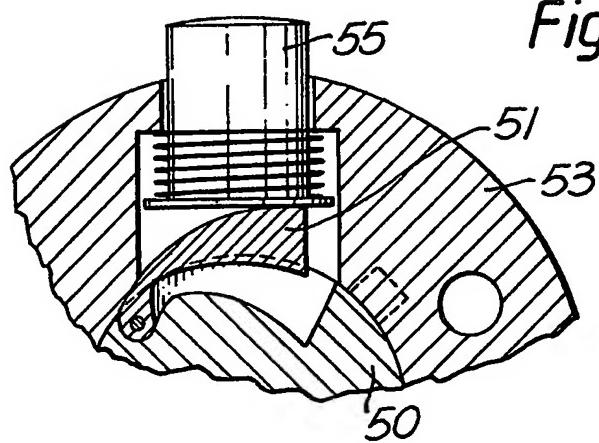
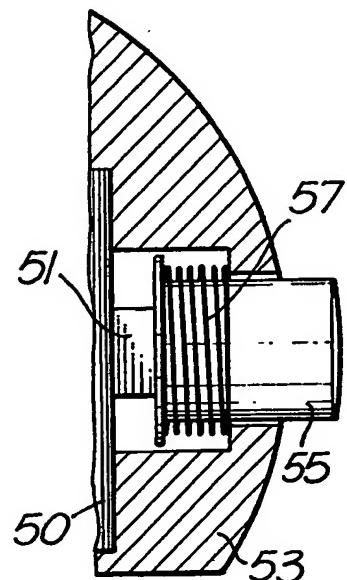
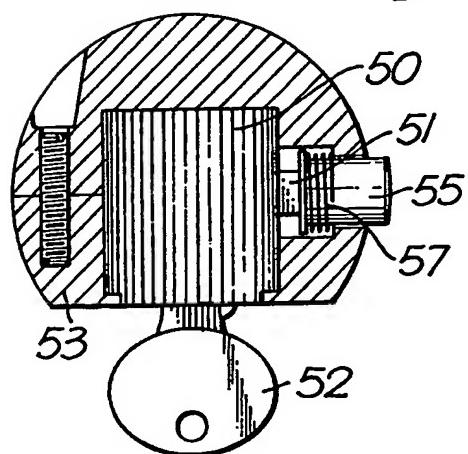
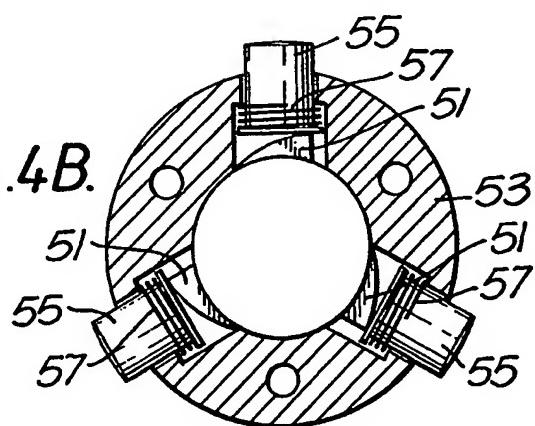


Fig. 3B.

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*Fig. 4D.**Fig. 4C.**Fig. 4A.**Fig. 4B.*

**SPECIFICATION****Ball and socket hitches**

- 5 This invention is concerned with ball and socket towing hitches and in particular to a locking device to prevent unauthorised use of a towing hitch. In use, the ball mounting of a towing hitch is secured to a towing vehicle  
 10 and the socket mounting is carried at the forward outer end of a trailer to be towed, such trailers being, in the form of, for example, horse boxes, caravans, or boat trailers.  
 Heretofore, a disadvantage of such towing  
 15 hitches which are wholly or partially of ferrous material has been that trailers, after being unhitched and left unattended, can be unauthorisedly hitched by a third party onto a ball mounting of a different towing vehicle, and  
 20 thereby stolen.

It is an object of the present invention to obviate or mitigate this disadvantage by providing means to prevent seating in an unhitched socket mounting of a towing hitch of  
 25 a ball mounting so as to prevent unauthorised use of the socket mounting to facilitate removal of a trailer.

According to the present invention, there is provided in or for a socket mounting of a ball  
 30 and socket towing hitch, a locking device engageable in the socket or across the mouth of the socket to prevent unauthorised entry of a ball mounting therein, said device being locatable in and removable from said socket in  
 35 a non-magnetised state, and actuatable in location for being magnetically retained therein.

The socket mounting is of a magnetisable material, and preferably the locking device has a first member of non-magnetisable material, a cylindrical bore being provided therein and extending upwardly from the bottom thereof to house a complementary shaped second member rotatably movable relative to the first member but axially fast, two permanent magnets being provided fast in the first member at diametrically opposed locations of and forming part of the wall of the bore, the second member having a lock operable by key at its outer lower end and at its inner upper  
 45 end having a ferrous central portion symmetrically flanked by two non-ferrous substantially segmental outer portions, the locking device being movable between two positions, namely a first position in which the magnetic flux  
 50 flows internally between the magnets through the ferrous portion of the second member, to hold said locking device in said socket mounting, and a second position in which the magnetic flux between the magnets is interrupted by the non-ferrous flanking portions.

Preferably also, means are provided associated with the rotatable second member whereby on rotation from first to second position, said means extend from and engage with  
 55 an internal part of said socket mounting as a

secondary locking movement.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in

70 which:-

Figure 1A is a vertical cross-sectional view of a socket mounting of a ball and socket towing hitch, Fig. 1B and 1C are respectively two vertical cross-sectional views of a locking device at right angles to each other, and Fig. 1D is a horizontal cross-sectional view of the locking device, Figs. 1A, 1B, 1C and 1D all being according to a first embodiment of the present invention;

80 Figures 2A, 2B and 2C are vertical cross-sectional views respectively of three other alternative constructions of the locking device;

Figures 3A and 3B are respectively a vertical cross-sectional view of a modified socket mounting and a locking device therefor according to a second embodiment; and

85 Figures 4A, 4B, 4C and 4D are respectively a cross-sectional view of a modified locking device shown in Fig. 3B, a horizontal cross-sectional view, an enlarged detail of Fig. 4A and an enlarged detail of Fig. 4B.

Referring to Figs. 1A and 1B, a locking device 10 according to a first and preferred embodiment has a flat bottom 10A and is otherwise of substantially spherical shape similar to the external shape of a ball of a ball mounting and complementary to a socket mounting 11. The device 10 is in two parts, namely first and second members. The first

95 member 10B is of non-magnetisable, non-ferrous material, such as aluminium, and has a cylindrical bore 12 provided extending upwardly and inwardly from the bottom 10A thereof. The second member 10C is of complementary shape to and is housed in said bore 12 wherein it is held axial fast but rotatably movable in a restricted arc of 90° relative to the first member. Two permanent magnets 6 are provided fast with the first

100 member 10B at diametrically-opposed locations of and forming part of the wall of the bore 12. Each permanent magnet 6 is formed of a magnetised rubber material having ferrous clips embedded therein and flanked on each

105 lateral side by a plate 6A of non-ferrous material. The magnets 6 are magnetised in such a manner as to cause the opposite poles to be disposed transversely of the longitudinal cylindrical axis towards diametrically-opposite sides thereof. The second member 10C is in

110 two connected parts, namely an outer lower end 9A comprising a barrel lock 5 operable by a key 13, and an inner upper end 9B having an axially central portion 8 of ferrous material symmetrically-flanked by two non-ferrous segmental outer portions 7. The key hole is provided in the outer face of the lock and a key 13 is provided to rotate the second member 10C from a first position

115 to a second position "ON" in which the magnetic flux

flows internally between the magnets 6 through the ferrous portion 8 of the second member 10C for the flux to pass through the ferrous socket mounting 11 to hold the locking device in position, to a second position designed "OFF" in which the magnetic flux does not flow through the ferrous portion 8 since the non-ferrous segmental portions 7 interrupt flux flow, as shown in Fig. 1D. In the first or "ON" position, the segmental portions 7 are aligned with corresponding plates 6A. The lock 5 is secured in position by adhesive, or may be screwed into position and a grub screw 14 urged against its circumference.

To locate the locking device 10, with the key 13 in the "OFF" position, the device is held under the socket and the handle 11A is lifted to allow entry of the device 10, the handle 11A pivoting about pivot 11B after being released by catch 11C. The handle 11A has only restricted movement, sufficient to allow entry of a ball or locking device 10. With the handle 11A released and again held by catch 11C, the locking device 10 is held in position and by turning the key 13 to the "ON" position is held there magnetically. The key 13 is then removed. When this locking device is in use as above, it is not possible using a ball hitch to tow away a trailer unauthorisedly:

Figs. 2A, 2B and 2C show diagrammatically other constructions of the device 10, the device in Fig. 2B being locatable across the mouth of the socket mounting 11, and the device in Fig. 2A and 2C being locatable in the socket mounting 11.

In a second embodiment as shown in Fig. 3A and 3B, a device 53 and socket mounting 54 are provided. The second member 50 has a cam 51 on its peripheral surface, and a movement of key 52 actuates a spring-biased bolt 55 against its influence into a bolt hole 56 in socket mounting 54. This bolt 55 is a secondary locking mechanism to that described in the first embodiment.

Figs. 4A, 4B, 4C and 4D show a modification of the device shown. In Fig. 3A the modification comprising three equi-spaced pivotal cams 51 whose outer surface bears against the inner end of respective bolts 55 spring-biased to an inward position in the first or "OFF" position of the device 53, and magnetically activated in the second position 55 of the device 53 to move the bolts 55 outwardly against the influence of the springs 57 for them to engage in bolt-holes (not shown) in the socket mounting 11.

In us, with an unhitched trailer (not shown) a locking device 53 as above-described is fitted into or over the entry of the socket mounting 11 when the device is in the "OFF" position. By using the key 52, the device is switched on and is thereby held in position magnetically, and the bolts 55 held

the device in the socket mounting as a secondary locking mechanism. For security, the key is removed.

## 70 CLAIMS

1. In or for a socket mounting of a ball and socket towing hitch, a locking device engagable in the socket or across the mouth of the socket to prevent unauthorised entry of a ball mounting therein, said device being locatable in and removable from said socket in a non-magnetised state, and actuatable in location for being magnetically retained therein.
2. A locking device as claimed in Claim 1, wherein the locking device has a first member of non-magnetisable material, a cylindrical bore being provided therein and extending upwardly from the bottom thereof to house a complementary shaped second member rotatably movable relative to the first member but axially fast, two permanent magnets being provided fast in the first member at diametrically opposed locations of and forming part of the wall of the bore, the second member having a lock operable by key at its outer lower end and at its inner upper end having a ferrous central portion symmetrically flanked by two non-ferrous substantially segmental outer portions, the locking device being movable between two positions, namely a first position in which the magnetic flux flows internally between the magnets through the ferrous portion of the second member, to hold said locking device in said socket mounting, and a second position in which the magnetic flux between the magnets is interrupted by the non-ferrous flanking portions.
3. A locking device as claimed in Claim 1 or 2, wherein means are provided associated with the rotatable second member whereby on rotation from first to second position, said means extend from and engage with an internal part of said socket mounting as a secondary locking movement.
4. A locking device as claimed in Claim 3 wherein the means are bolts spring biased inwardly of the first member and movable outwardly against their biasing by operation of cams on the peripheral surface of the second member to enter bolt-holes provided in a socket mounting.
5. A locking device substantially as hereinbefore described with reference to Figs. 1A, 1B, 1C, 1D, of the accompanying drawings.
6. A locking device substantially as hereinbefore described with reference to Fig. 2A of the accompanying drawings.
7. A locking device substantially as hereinbefore described with reference to Fig. 2B of the accompanying drawings.
8. A locking device substantially as hereinbefore described with reference to Fig. 2C of the accompanying drawings.
9. A locking device substantially as hereinbefore described with reference to Figs. 3A,

and 3B of the accompanying drawings.

10. A locking device substantially as herein fore described with reference to Figs. 4A, 4B, 4C and 4D of the accompanying drawings.

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